Project C-8: Enhancing the hydrogen storage capacity of graphitic nanofibres

G. Walker
University of Nottingham, UK
E-mail: gavin.walker@nottingham.ac.uk

Aim

The aim of the project is to modify the surface of graphitic nanofibres (GNFs) in order to enhance the hydrogen storage capacity for these materials. The project has three major objectives:

i) to remove amorphous carbon and thus improve hydrogen storage
ii) to remove caps over graphite layers, thus opening up more planes for hydrogen sorption
iii) to control the surface chemistry of GNFs to maximise hydrogen storage

2003 Summary

Refining the preparation of graphitic nanofibres has continued and good quality GNFs with herringbone and platelet microstructures can be reproducibly prepared. Acid reflux modifications of GNF samples have been investigated. Depending on the reflux conditions used, this has led to etching of the GNFs and x-ray photoelectron spectroscopy has detected an increase in oxygenated species at the surface. Hydrogen uptake measurements have been performed up to 100 bar at room temperature on a variety of samples to investigate the effect of microstructure and of the reflux treatments. However, significant reproducible hydrogen uptakes were not measured for the samples tested; hydrogen uptake capacities were less than 0.4 wt.%.

Future Work

High resolution TEM will be used to assess the extent to which amorphous carbon and graphite layer caps have been removed by the reflux treatments. The effect of oxygenated surface species on hydrogen uptake capacity of GNFs will be investigated.